

# LA-UR-22-20817

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# Los Alamos National Laboratory

Mike Steinzig

Texas Tech, November 2021

# Outline

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- What is LANL?
- What is the primary mission of LANL?
  - What are secondary and tertiary missions?
- Who funds LANL, and what is the budget
  - How does this compare to other endeavors?
- How does LANL achieve it's mission?
- What opportunities are at LANL?

# Statements about what we do

- **Mission:** Los Alamos National Laboratory's mission is to solve national security challenges through scientific excellence.
  - Deterrence and Stockpile Stewardship
  - Protecting Against Nuclear Threats
  - Emerging Threats and Opportunities
  - Energy Security Solutions



# Statements about who we are

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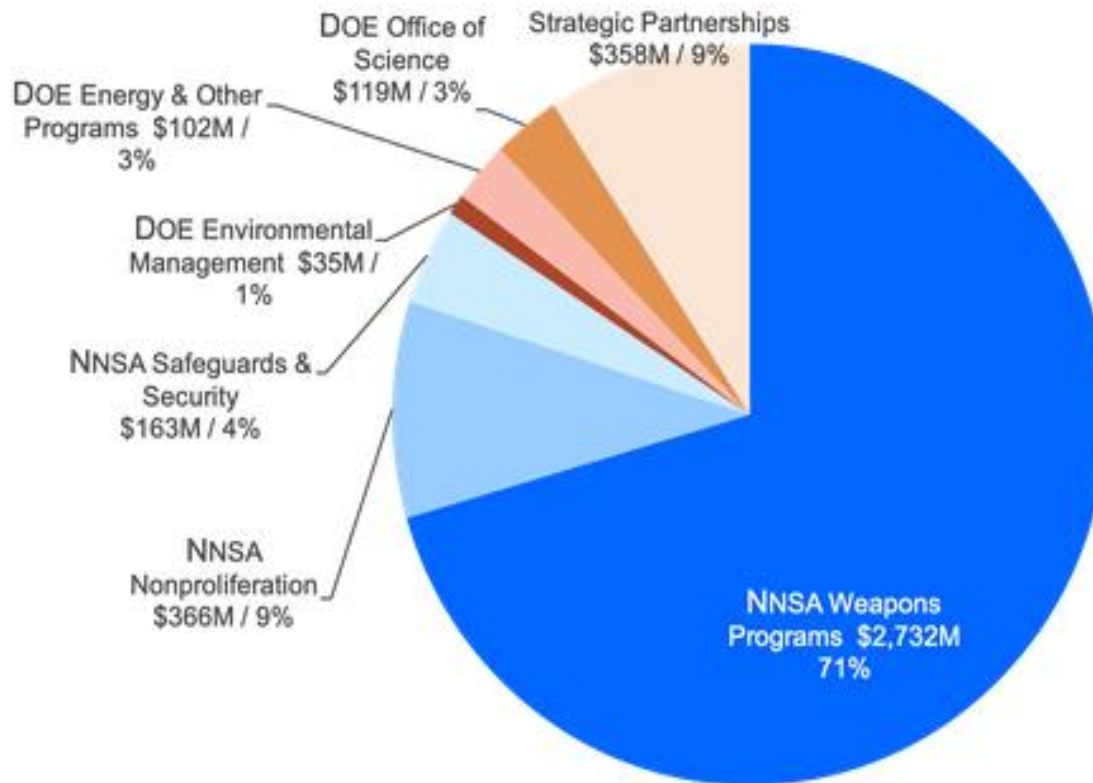
- **Vision:** To be trusted by our nation, emulated by our peers, and respected by the world.
- **Culture:** Cultivate a culture where how we work is as important as what we do. This evolving, iterative journey includes proactively managing risk, focusing on our work, and relying on continuous learning to strengthen this foundation.
- **Values**
  - Service; Serving our nation, partners, community and each other.
  - Integrity; Demonstrating honesty, ethical conduct, accountable stewardship, and individual responsibility.
  - Teamwork; Achieving our best by respecting diverse opinions and backgrounds, exploring alternatives, and collaborating with colleagues and partners.
  - Excellence; Ensuring safe and secure mission delivery in nuclear security; science, technology, and engineering; operations; and community relations.

# A tradition of excellence looking to the future

- 1943 established as part of the Manhattan project
- 1945 Trinity device tested in New Mexico
- 1945 Little Boy and Fat Man
- 1952 MIKE test—1<sup>st</sup> full scale thermonuclear device tested yield of 10.4 MT
- 1988 W88 enters stockpile
- 1989 LANSCE proton radiography facility dedicated
- 1989 U.S. halts the manufacture of nuclear weapons
- 1992 U.S. conducts last underground nuclear weapons test
- 1994 Stockpile Stewardship Program established
- 1999 DARHT Axis1 operational
- 2007 1<sup>st</sup> LANL manufactured pit delivered
- 2008 Road Runner world's 1<sup>st</sup> supercomputer to achieve 1 petaFlop operations
- 2009 DARHT Axis 2 operational
- 2010 Cielo supercomputer delivered
- 2011 NWC approves B61-12; last W88 WR pit delivered
- 2012 Alt370 (SNL) of the W88 authorized by NWC
- 2015 W88 CHE work added to Alt370
- 2019 FPU of W76-2, completion of W76-1 rebuilds
- 2020 W88 Alt370 FPU
- 2022 B61-12 LEP scheduled for completion



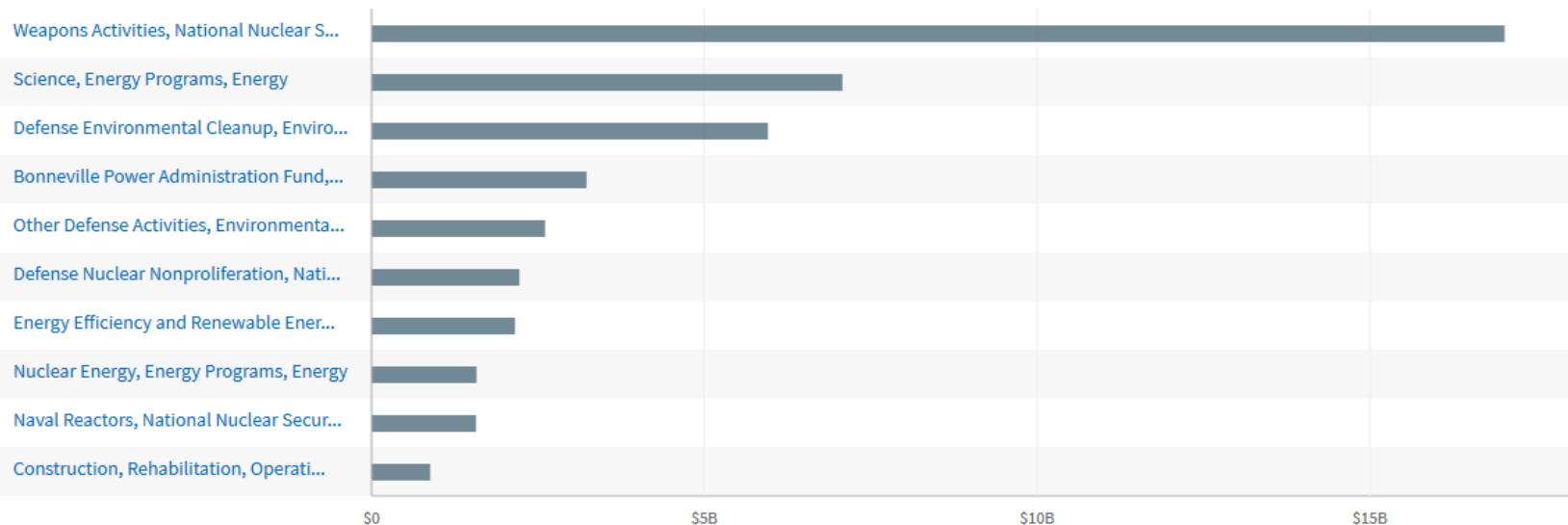
# Who Funds LANL?



DOE funds LANL

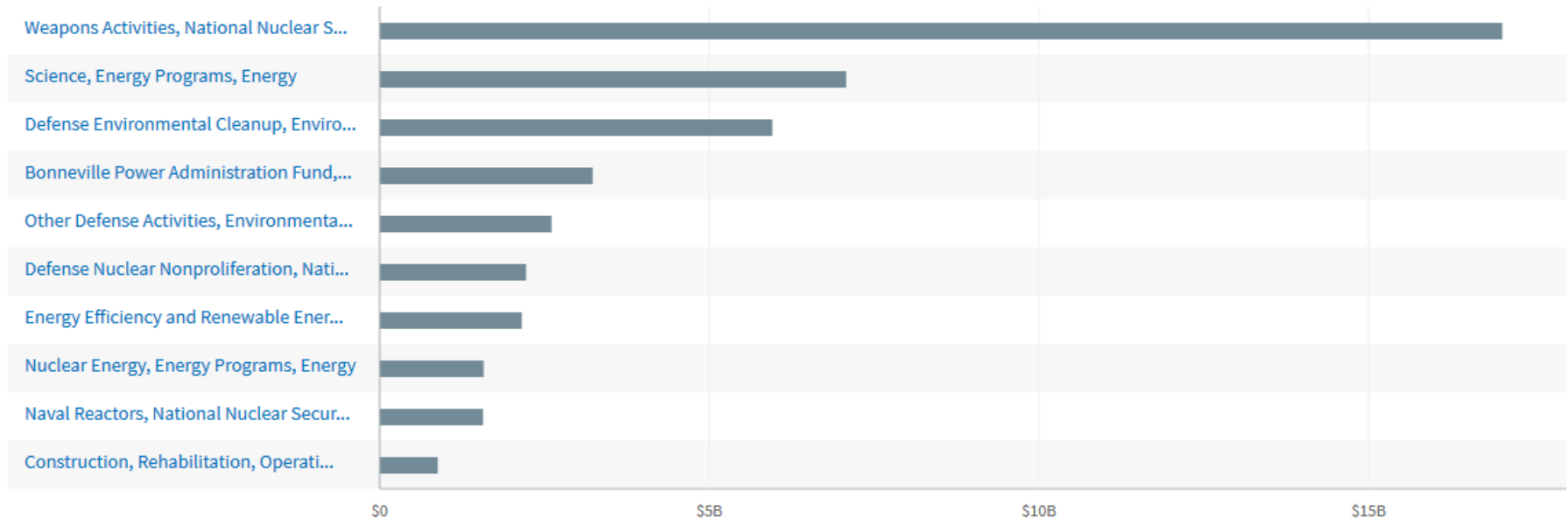
# Some misconceptions

- DoE is energy
  - DOE's budget is \$35B. Largest item is ??
- LANL builds and/or tests nuclear weapons
  - NO nuclear weapons at LANL; Last nuclear test in the US occurred in ??
- The nuclear triad is ??????????



# Some misconceptions

- DoE is energy
  - DOE's budget is \$35B. Largest item is NNSA - \$20B
- LANL builds and/or tests nuclear weapons
  - NO nuclear weapons at LANL; Last nuclear test in the US occurred in 1993
- The nuclear triad is NOT about the nuclear warhead, it is about the launch platform; aircraft, land-based, submarine



# What does LANL do?

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- Design Agency (DA) for nuclear weapons
- Production Agency
  - The only US facility that can fabricate plutonium (but that may be changing)
  - Detonator production

If there are no new designs, what is this \$20B enterprise doing?

# What does LANL do?

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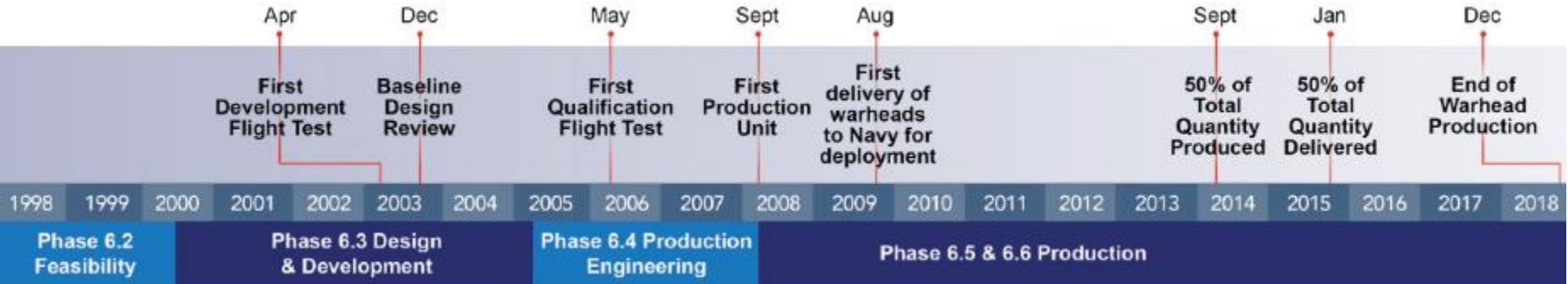
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If there are no new designs, what is this \$20B enterprise doing?

- Annual Assessment; Provide to the President of the United States the annual status of the U.S. nuclear weapons stockpile safety, security, reliability, and effectiveness
- When certification can't be done, provide alternatives (LEP)

# The nation's first Life Extension Plan (LEP)

- W76 designed in 1976, stockpiled in 1978



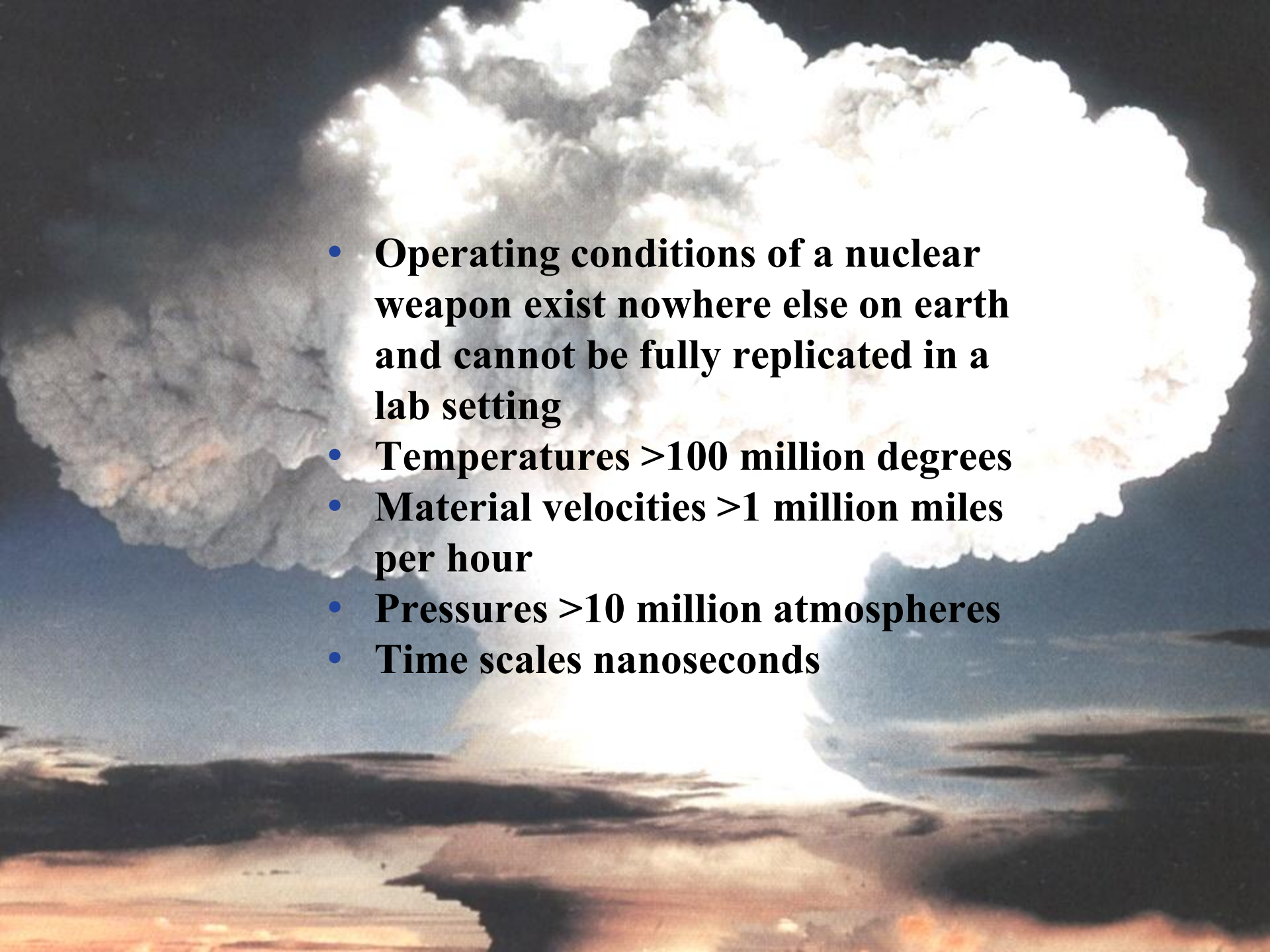
A change in direction for US Nuclear Weapons

UNCLASSIFIED

# What is involved with an LEP?

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- Requirements management
- Nuclear Explosives Package (NEP) design
- Management of Product Realization Teams (PRTs) in support of product development
- manufacturing, production qualification, and design basis qualification that will ultimately conclude with weapon certification.
- [https://www.youtube.com/watch?v=gZ1e\\_N63W7E](https://www.youtube.com/watch?v=gZ1e_N63W7E)  
(centrifuge 2:50)
- [https://int.lanl.gov/news/\\_story\\_images/2019/january/0131-W76-1%20small-1.gif](https://int.lanl.gov/news/_story_images/2019/january/0131-W76-1%20small-1.gif)

- 
- A large, billowing mushroom cloud from a nuclear explosion dominates the background. The cloud is bright white and yellow at its base, where it meets a dark, turbulent plume of smoke and debris. The sky is a deep blue, and the ground below is visible as a dark, hazy landscape.
- **Operating conditions of a nuclear weapon exist nowhere else on earth and cannot be fully replicated in a lab setting**
  - **Temperatures >100 million degrees**
  - **Material velocities >1 million miles per hour**
  - **Pressures >10 million atmospheres**
  - **Time scales nanoseconds**

# LANL is the DA for 4 of 7 of the deployed nuclear stockpile



B61 Bomb  
B2A/F16/B21



W76/W88 SLBM  
Trident II D5 missile



W78 ICBM  
Minuteman III



LANL designed 5 of the 7 deployed warheads

# LANL is part of the nuclear security enterprise

## National Laboratories and Test Site



**Los Alamos  
National Laboratory**  
*Los Alamos, New Mexico*  
Nuclear design lab



**Lawrence Livermore  
National Laboratory**  
*Livermore, California*  
Nuclear design lab



**Sandia National Laboratories**  
*Albuquerque NM and Livermore CA*



**Nevada National Security Site**

## Production Complex



**Pantex Plant**  
*Amarillo, Texas*



**Kansas City Plant**  
*Kansas City, Missouri*



**Y-12 National Security Complex**  
*Oak Ridge, Tennessee*



**Savannah River Site**  
*Aiken, South Carolina*

Other collaborators such as Boeing, Lockheed, General Dynamics, Johns Hopkins, Raytheon, L3...

# LANL is part of the nuclear security enterprise



# Who is our customer?



- Our CUSTOMERS are the US Military
- Our Funding agency is DOE/NNSA



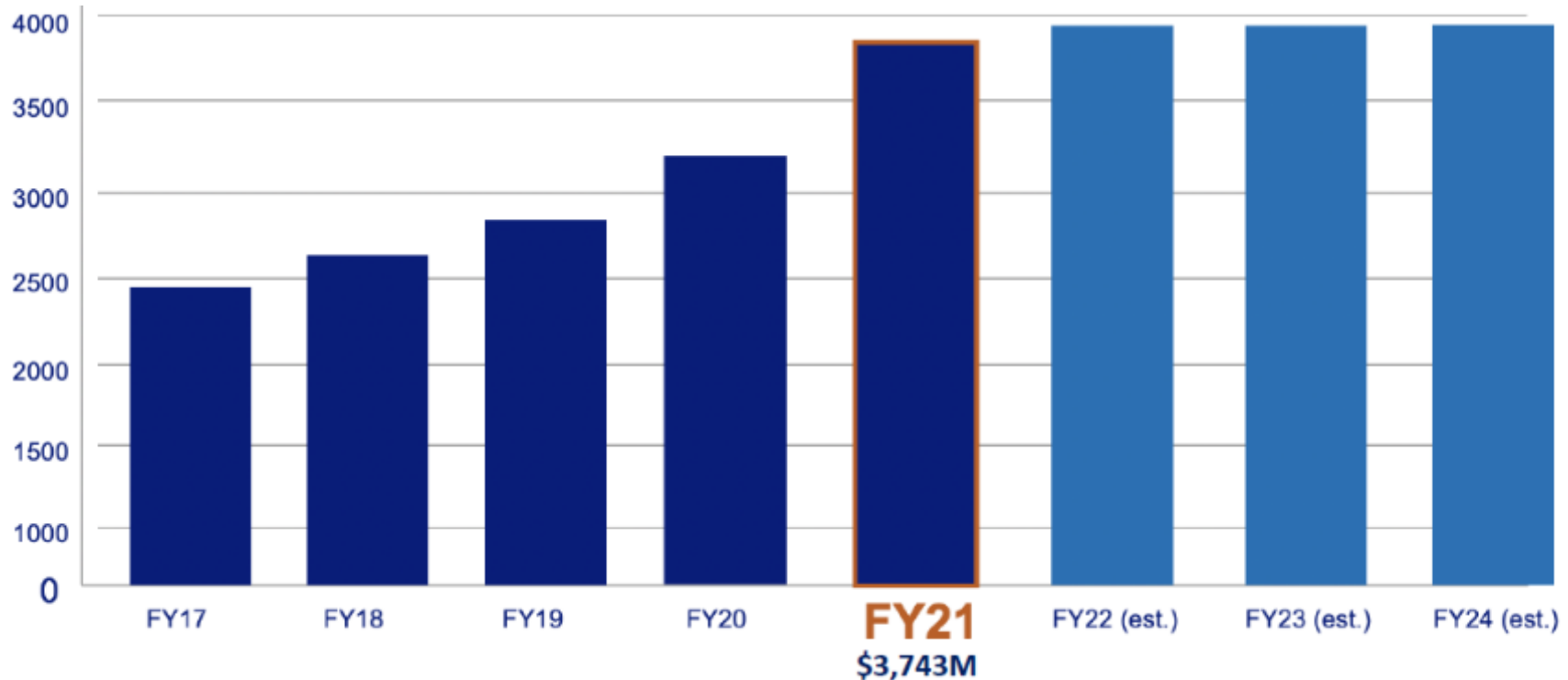
This is a somewhat unusual arrangement

# Recent/Ongoing/Future

- W88 Alt370 - FPU completed 2021, production through 2025
- B61-12 – LEP: FPU scheduled for 22, production through 2025
- W87-1 – currently in the 2<sup>nd</sup> year of an LEP with LLNL
- W80-4 – currently in Phase 6.3
- Pit Production – For the W87-1 (80 pits per year, includes SRPPF)
- W93 – First Phase 1 since the CTBT
- New launch platforms (Ohio Class Submarine, Ground Based Strategic Deterrent ICBM)



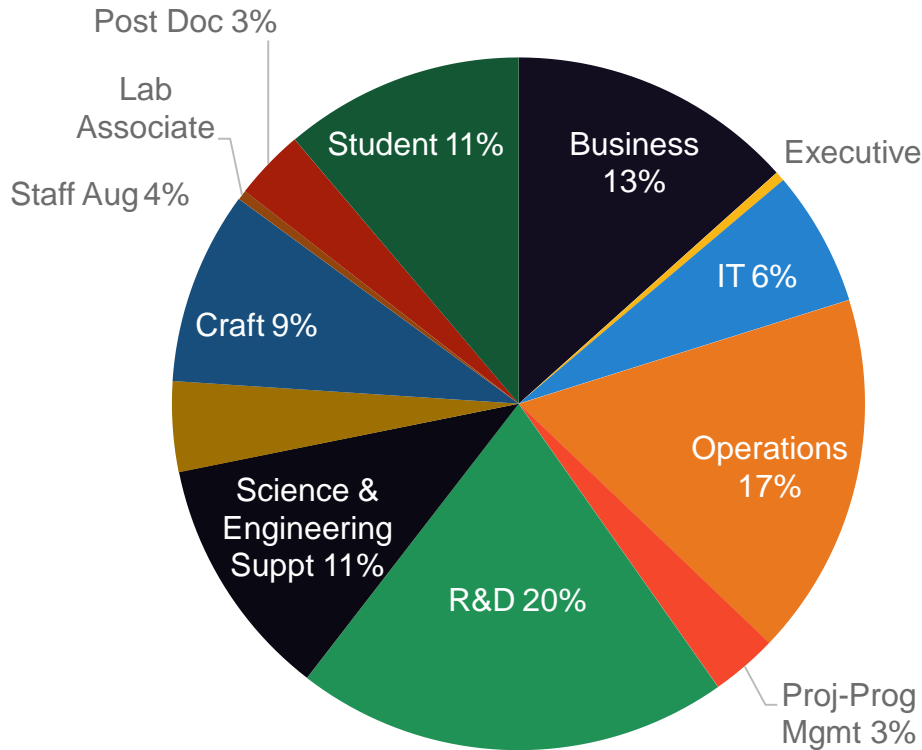
# What is the LANL budget trend?



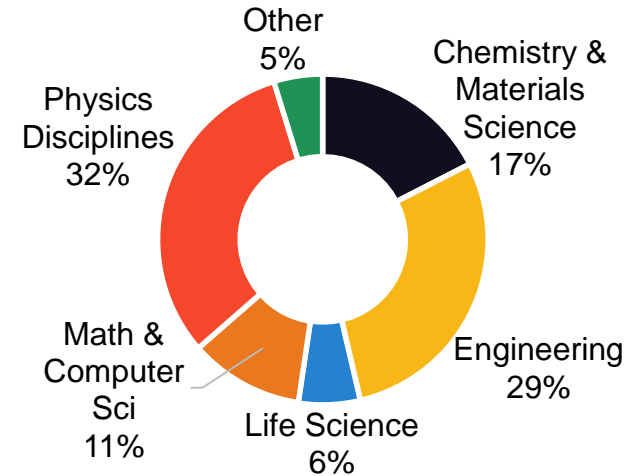
**LANL operating budget has grown significantly in recent years (30 pits per year)**

# How does LANL complete this task: 13,000 employees

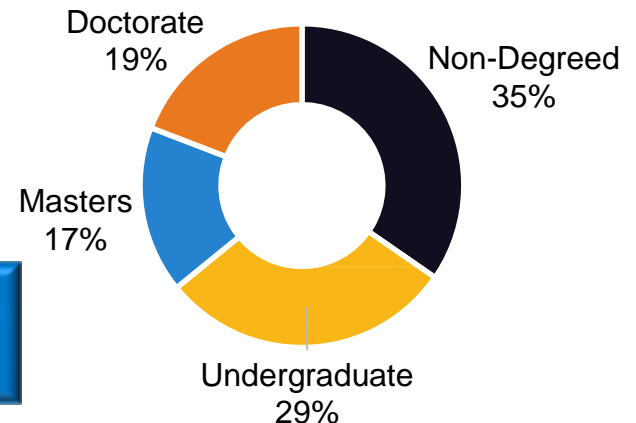
## Employee Categories



## R&D Employee Disciplines

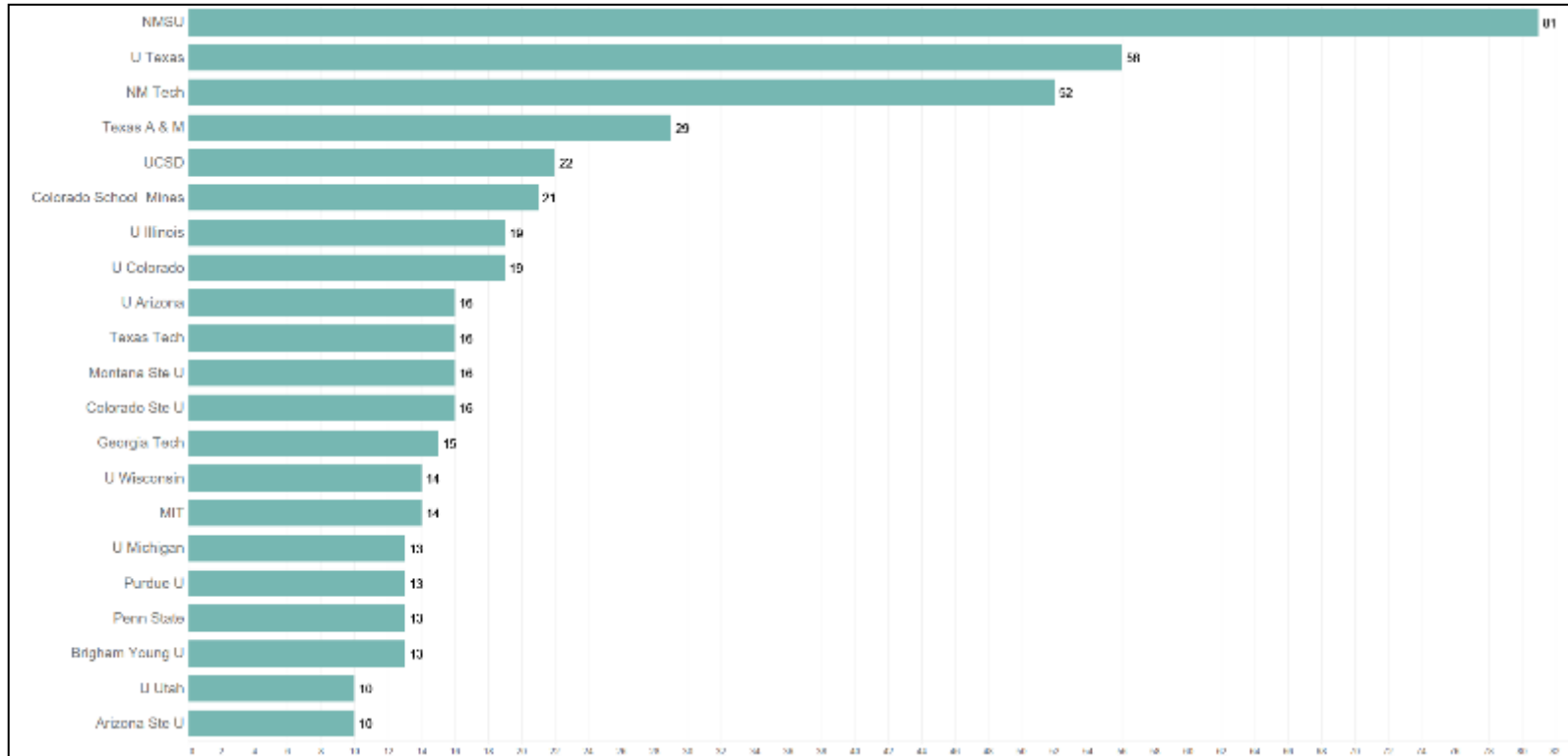


## Degreed Workforce



LANL will be hiring an additional 1000 people over the next year.

# R&D Engineers by Top 20 Feeder Schools



# How does LANL complete this task? Facilities



**Metropolis Center for Modeling & Simulation**



**High Explosive Laboratories**



**Los Alamos Neutron Science Center**



**Plutonium Processing Facility**



**Chemistry and Metallurgy Building**



**Dual Axis Radiographic Hydrotest Facility**



**SIGMA Building**



**Chemistry & Metallurgy Research Replacement (RLUOB)**

# What makes LANL a great place to work?

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- Hugely diversified work force
  - Materials science, chemistry, engineering, physics....
  - Theoretical and experimental capabilities
  - Great management
  - Funding and customer are separated
- Lab Directed Research and Development ('92 Congress)
  - 6% “tax” on all funding
  - LDRD patents/publications/citations account for ~1/4 of LANL's total
  - Distributed by competitive proposal/review process
  - A means to recruit/retain talent; funds ~ 1/2 of postdocs at LANL

R&D100 awards:

2020-Eight; 2019-nine; 2018-Eight; 2017-eight, 2016-5.....

<https://www.youtube.com/watch?v=S4krKYGUopg>

# LANL's expertise with High Explosives and realistic training scenarios reinforce class room knowledge to troops



EST. 1943

# LANL's facilities and mission

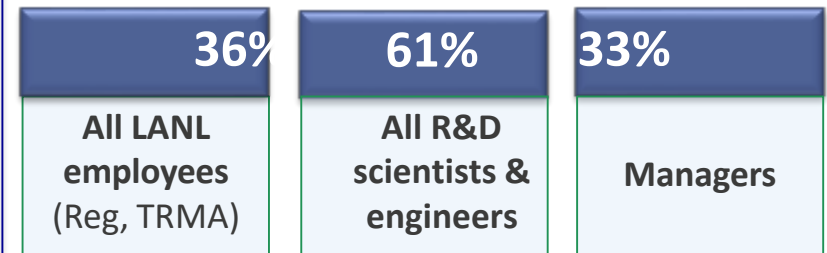
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- Video of DAHRT;  
<https://www.youtube.com/watch?v=FOCJCsC8gl4> (4.5 minutes)
- <https://youtu.be/SdRmhrf6oXE> (Miles OBrien stewardship 9 minutes)
- <https://youtu.be/fmP-ymRhI9U> (Mission, 3 minutes)

# Healthy student and postdoc programs are vital to the Laboratory's early-career pipeline

- Each year, more than 1,880 students and 400 postdocs work at Los Alamos
  - Los Alamos pays for advanced degrees
- Conversion of postdocs to technical staff is our most highly utilized early career pipeline

## Percentage of total LANL population who were former students or postdocs



Educational exchanges with military academies



Summer Physics Camp



Supercomputing Challenge

# Employment opportunities Available

Utilize the Lab Career website (**lanl.jobs**) as a resource. You can search for opportunities throughout the Laboratory complex.



## We are hiring

Open Positions

How to Apply

Recruiting Events

Vets & Transitioned Military



## Our Commitment

Veterans and members of the U.S. armed forces have contributed their tremendous talents to serve our country. We honor their commitment and are dedicated to assist veterans and transitioning service members to continue serving their country through meaningful careers with the Laboratory.



**Veteran Recruiter**

Finding your ideal career match may



**Pipelines to Employment**

While individuals may find the



**New Mexico Workforce Connection for Veteran Programs**

# A variety of student options

## Student Internships

High School (HS)



Undergraduate (UGS)



Graduate (GRA)



## Helpful Links

- Career Resources
- Summer Schools
- External Funding Opportunities
- Inclusion & Diversity
- Example Intern Projects
- Life in Northern New Mexico
- Scholarships
- Science & Innovation at Los Alamos
- Student Housing
- Student Symposium

## Contacts

Scott Robbins



Emily Robinson



Cassandra Casperson



Josefina Salazar



Questions?

# The 6.x design process is used

## Phase 6.X Process

